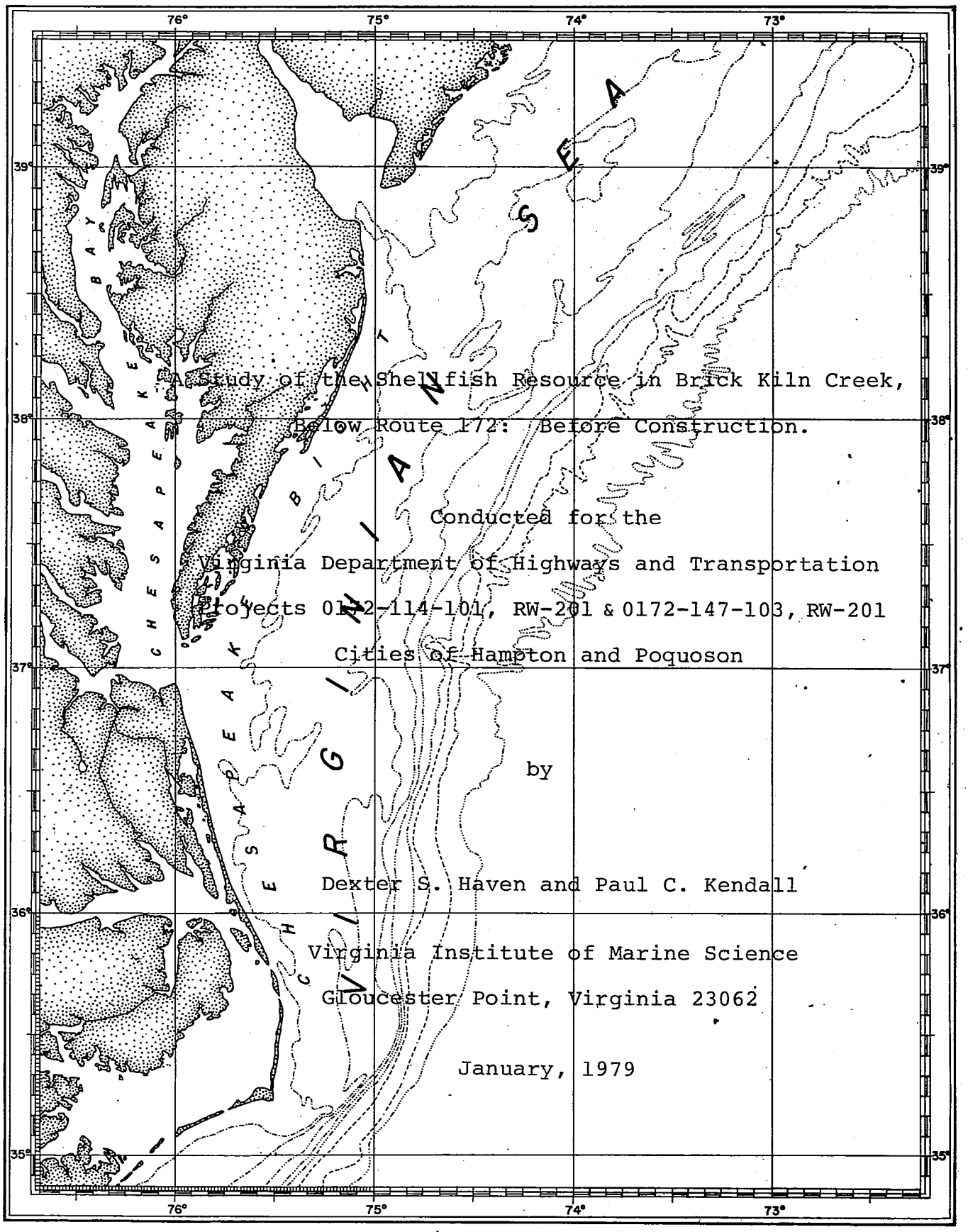
1-1979

A study of the shellfish resource in Brick Kiln Creek, below Route 172, before construction

Dexter S. Haven
Virginia Institute of Marine Science

Paul C. Kendall
Virginia Institute of Marine Science



A Study of the Shellfish Resource in Brick Kiln Creek, Below Route 172: Before Construction.

Conducted for the

Virginia Department of Highways and Transportation

Projects 0172-114-101, RW-201 & 0172-147-103, RW-201

Cities of Hampton and Poquoson

by

Dexter S. Haven and Paul C. Kendall

Virginia Institute of Marine Science

Gloucester Point, Virginia 23062

January, 1979

A Study of the Shellfish Resource in Brick Kiln Creek, Below Route 172: Before Construction.

Conducted for the

Virginia Department of Highways and Transportation

Projects 0172-114-101, RW-201 & 0172-147-103, RW-201

Cities of Hampton and Poquoson

by

Dexter S. Haven and Paul C. Kendall

Virginia Institute of Marine Science

Gloucester Point, Virginia 23062

January, 1979

ABSTRACT

Sampling of the shellfish resource in the lower part of Brick Kiln (or Wythe) Creek was conducted by personnel of the Virginia Institute of Marine Science during August, October and November of 1978. Live oysters were found in several places from the bridge downstream to the mouth. Observations indicate that the oyster beds here have average growth and normal rates of survival; recruitment is occurring. No other species of commercially valuable shellfish was found.

INTRODUCTION

Background

The Virginia Institute of Marine Science, Department of Applied Biology conducted sampling in the lower portion of Brick Kiln Creek during August, October and November of 1978. The sampling was done at the request of the Virginia Department of Highways and Transportation for projects 0172-114-101, RW-201, and 0172-147-103, RW-201. The objective of our study was to determine the extent and value of the shellfish resource on leased grounds in the creek before construction of a new bridge for Route 172. This report is an analysis of our sampling before construction.

Description of Area

Brick Kiln Creek connects Big Bethel Reservoir and the Northwest Branch of Back River; it serves as a drain for the reservoir and the surrounding marshes. Below the Route 172 bridge, Brick Kiln Creek separates the cities of Poquoson and Hampton.

The creek below the bridge is narrow and deep; at high tide depths of 12 feet are common with a few 15-foot depths at the turns. Only near the mouth did the creek begin to widen and then only slightly. As the creek widened depth decreased gradually.

On both sides marsh grasses grow to the edge of the creek. In one place, beside Mr. Freeman's lease, trees grow down to the water's edge. Peat and mud mixed border the creek on both sides.

The area is not restricted for shellfish culture.

METHODS

Locating the Leases

Lease boundaries were located with the aid of surveyor's plats from the VMRC (Figure 1). The lower boundary of Mr. Freeman's lease (which was also the upper end of Mr. Hahn's Tract II) was substantiated by finding an old landing also shown on the plat; the upper limit of the lease was located by the use of a measuring line. Several stakes in a line across the creek located the point where the plat showed the upper limit of Mr. Hahn's Tract I (which was also the lower limit of Mr. Firth's lease). The upper limit of Mr. Firth's ground, which almost coincided with the upper boundary of the bridge right-of-way, was determined with a measuring line.

Right-of-way boundaries were determined by measuring with a line from the edges of the bridge as shown on survey sheets provided by the Virginia Department of Highways.

Table 1 shows the acres of the leases, the lessees, stations occupied and number of samples taken. Table 2 shows methods used in calculations.

Table 1

Listing of Areas of Bottom in Brick Kiln Creek

Lessee's Name	Size of Lease (Acres)	Size of Area Sampled (Acres)	No. of Stations Occupied	No. of Samples Taken
A. M. Firth	2.99	2.99	130	185
M. E. Hahn, Tract I	3.05	3.05	24	48
H. Freeman	0.63	0.63	5	10
M. E. Hahn, Tract II	4.00	2.74	14	28

Table 2

Methods of Calculating Estimates of Density and Quantities of Oysters and Shell.

1. Each grab or lick of the tongs covered a known area of bottom. (The area covered by the tongs varied because the depth of the water varied with the change in tide.)

   a. At high tide, when the water was its deepest, the coverage of the tongs was 1.5 square feet per lick. This was the coverage when Mr. Firth's ground was sampled, so the above figure was used to calculate density and quantity of oysters and shell on his ground.

   b. At low tide, when the shallowest water was experienced, the tongs could be opened wider, until they covered 3.75 square feet; this was the coverage at the lower end of Mr. Hahn's ground.

   c. In the middle of our sampling in the creek, the tongs covered mid-way between 1.5 and 3.75 square feet or 2.6 square feet. This was the coverage on the upper portion of Mr. Hahn's lease.

   d. The tong opening varied between 2.6 and 3.75 square feet during the latter part of our sampling; therefore, an average of these two, 3.2 square feet, has been used in calculating the density on all of Mr. Freeman's ground and on the majority of Mr. Hahn's ground.

2. The following size distribution and number per bushel were seen:

	A. M. Firth	M. E. Hahn	H. Freeman
No. per bu.	350	334	-
Market	59%	59%	49%
Small & Yearling	41%	41%	51%

3. Estimated quantities of oysters and shell were calculated as shown below:

Table 2 (Contd.)

For example, using data from Mr. Freeman's ground (Table 5): at station One a total of 10 oysters and 2 quarts of shell were taken in two licks, each covering 3.2 square feet of bottom. The sample taken at the station is assumed to be representative of the bottom for a one hundred foot portion of the creek; since the ground leased was 50 feet wide, the area represented by the sample was 5000 square feet.

Calculation of density:

10 oysters ÷ 6.4 square feet = 1.6 oysters/sq ft

2.0 quarts ÷ 6.4 square feet = 0.31 qt/sq ft

Calculation of estimated quantity:

$$\frac{1.6 \text{ oysters}}{\text{sq ft}} \times 5000 \text{ sq ft} \div \frac{334 \text{ oysters}}{\text{bu}} = 24 \text{ bu of oysters}$$

$$\frac{0.31 \text{ qt}}{\text{sq ft}} \times 5000 \text{ sq ft} \div \frac{50 \text{ qts}}{\text{Va. bu}} = 31 \text{ bu of shell}$$

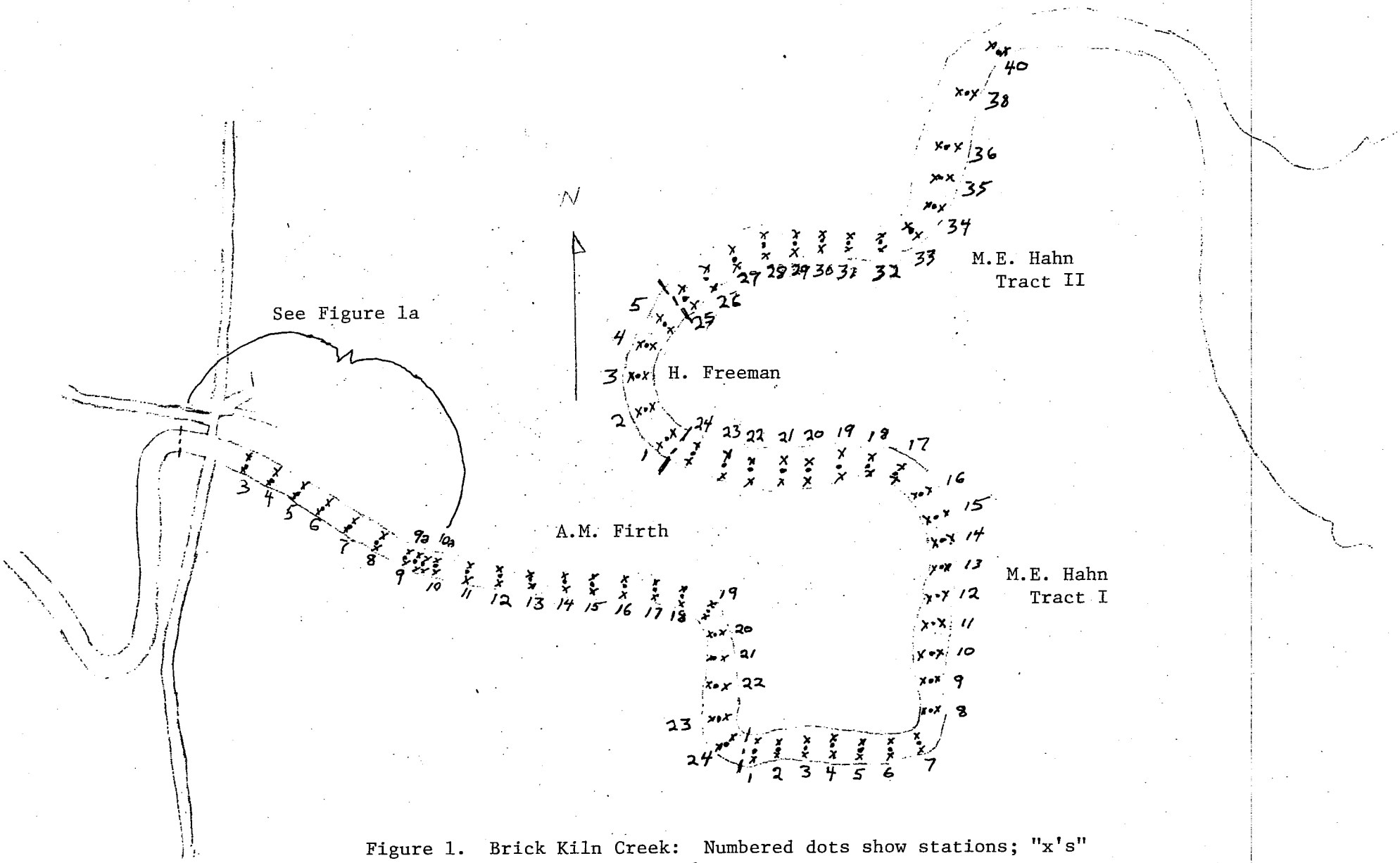


Figure 1. Brick Kiln Creek: Numbered dots show stations; "x's" show where samples were taken.

Sampling points were generally located 10 to 20 feet apart on either side of the central axis of the river. These two samples were combined and termed a station. The stations were located about 100 feet apart (Figure 1). Distance between stations was determined by towing a 100 foot-long line behind the boat. Only one grab was made at the following stations: 1 through 42 upstream of the bridge, in the existing right-of-way; and 1 through 33 upstream of the bridge, in the proposed addition to the right-of-way.

In the vicinity of the right-of-way, sampling was much more intensive with 75 stations being occupied in 0.176 acres (Figure 1a; Tables 3 and 3a). In all calculatiions of oyster density, the width of each 100 foot segment was 50 ft (the average width of the lease), (Table 2).

Sampling

The most of the sampling was done on 16 August 1978. Samples were taken by an experienced waterman using ordinary hand tongs. Measurements of the distance which the tongs opened were made at the beginning and at the end of the day. Sampling began in the morning at the downriver edge of the bridge when the tide was at its highest. Sampling was concluded in the afternoon near the mouth of the creek when the tide was low. From the measurements of the opening of the tongs, the area covered by each lick of the tongs was calculated (Table 2).

Table 3

Results of Sampling Ground Leased by Mr. A. M. Firth in Brick Kiln Creek - 16 Aug, 23 Oct, and 14 Nov, 1978.

Sample Station	Bottom Type[1]	Area Covered (sq ft)	Live Oysters			Boxes		Shell	
			Number	Density (No./ft^2)	Spat	Number	Percentage of Total	Volume (qts)	Density (Qts/ft^2)
A. Upstream of the Bridge									
1. Existing Right-of-Way									
1a	M	3.0	0	-	0	0	-	0	-
1b	M	3.0	0	-	0	0	-	0	-
I	M	5.2	0	-	0	0	-	0	-
J	M	5.2	0	-	0	0	-	0	-
K	M	5.2	0	-	0	0	-	0	-
L	M	5.2	0	-	0	0	-	0	-
1	M	1.5	1	0.67	0	0	-	0	-
2	M	1.5	0	-	0	0	-	0	-
3	M	1.5	0	-	0	0	-	0	-
4	M	1.5	0	-	0	0	-	0	-
5	M	1.5	0	-	0	0	-	0	-
6	M	1.5	0	-	0	0	-	0	-
7	M	1.5	0	-	0	0	-	0	-
8	M	1.5	0	-	0	0	-	0	-
9	M	1.5	0	-	0	0	-	0	-
10	M	1.5	0	-	0	0	-	0	-
11	M	1.5	0	-	0	0	-	0	-
12	M	1.5	0	-	0	0	-	0	-
13	M	1.5	0	-	0	0	-	0	-
14	M	1.5	0	-	0	0	-	0	-
15	M	1.5	0	-	0	0	-	0	-
16	M	1.5	0	-	0	0	-	0	-
17	M	1.5	0	-	0	0	-	0	-
18	M	1.5	0	-	0	0	-	0	-
19	M	1.5	0	-	0	0	-	0	-
20	M	1.5	0	-	0	0	-	0	-

Table 3 (Contd.)

Sample Station	Bottom Type[1]	Area Covered (sq ft)	Live Oysters			Boxes		Shell	
			Number	Density (No./ft^2)	Spat	Number	Percentage of Total	Volume (qts)	Density (Qts/ft^2)
21	M	1.5	0	-	0	0	-	0	-
22	M	1.5	0	-	0	0	-	0	-
23	M	1.5	0	-	0	0	-	0	-
24	M	1.5	0	-	0	0	-	0	-
25	M	1.5	0	-	0	0	-	0	-
26	M	1.5	0	-	0	0	-	0	-
27	M	1.5	0	-	0	0	-	0	-
28	M	1.5	0	-	0	0	-	0	-
29	M	1.5	0	-	0	0	-	0	-
30	M	1.5	0	-	0	0	-	0	-
31	M	1.5	0	-	0	0	-	0	-
32	M	1.5	0	-	0	0	-	0	-
33	M	1.5	0	-	0	0	-	0	-
34	M	1.5	0	-	0	0	-	0	-
35	M	1.5	0	-	0	0	-	0	-
36	M	1.5	0	-	0	0	-	0	-
37	M	1.5	0	-	0	0	-	0	-
38	M	1.5	0	-	0	0	-	0	-
39	M	1.5	0	-	0	0	-	0	-
40	M	1.5	0	-	0	0	-	0	-
41	M	1.5	0	-	0	0	-	0	-
42	M	1.5	0	-	0	0	-	0	-
Estimated Qty:				Negligible					0 bu
2. Proposed addition to Right-of-Way									
1c	M	3.0	0	-	0	0	-	0	-
1d	M	3.0	0	-	0	0	-	0	-
M	M	5.2	0	-	0	0	-	0	-
N	M	5.2	0	-	0	0	-	0	-

Table 3 (Contd.)

Sample Station	Bottom Type[1]	Area Covered (sq ft)	Live Oysters			Boxes		Shell	
			Number	Density (No./ft^2)	Spat	Number	Percentage of Total	Volume (qts)	Density (Qts/ft^2)
1	M	1.5	0	-	0	0	-	0	-
2	M	1.5	0	-	0	0	-	0	-
3	M	1.5	0	-	0	0	-	0	-
4	M	1.5	0	-	0	0	-	0	-
5	M	1.5	0	-	0	0	-	0	-
6	M	1.5	0	-	0	0	-	0	-
7	M	1.5	0	-	0	0	-	0	-
8	M	1.5	0	-	0	0	-	0	-
9	M	1.5	0	-	0	0	-	0	-
10	M	1.5	0	-	0	0	-	0	-
11	M	1.5	0	-	0	0	-	0	-
12	M	1.5	0	-	0	0	-	0	-
13	M	1.5	0	-	0	0	-	0	-
14	M	1.5	0	-	0	0	-	0	-
15	M	1.5	0	-	0	0	-	0	-
16	M	1.5	0	-	0	0	-	0	-
17	M	1.5	0	-	0	0	-	0	-
18	M	1.5	0	-	0	0	-	0	-
19	M	1.5	0	-	0	0	-	0	-
20	M	1.5	0	-	0	0	-	0	-
21	M	1.5	0	-	0	0	-	0	-
22	M	1.5	0	-	0	0	-	0	-
23	M	1.5	0	-	0	0	-	0	-
24	M	1.5	0	-	0	0	-	0	-
25	M	1.5	0	-	0	0	-	0	-
26	M	1.5	0	-	0	0	-	0	-
27	M	1.5	0	-	0	0	-	0	-
28	M	1.5	0	-	0	0	-	0	-
29	M	1.5	0	-	0	0	-	0	-
30	M	1.5	0	-	0	0	-	0	-
31	M	1.5	0	-	0	0	-	0	-
32	M	1.5	0	-	0	0	-	0	-
33	M	1.5	0	-	0	0	-	0	-
Estimated Qty:				0 bu					0 bu

Table 3 (Contd.)

Sample Station	Bottom Type[1]	Area Covered (sq ft)	Live Oysters			Boxes		Shell	
			Number	Density (No./ft^2)	Spat	Number	Percentage of Total	Volume (qts)	Density (Qts/ft^2)
B. Downstream of the Bridge									
1. Right-of-Way									
2	MS, ST	3.0	18	6.0	0	6	25	1.5	0.50
A	-	5.2	0	-	0	0	9	0.6	0.11
B	MS, ST	5.2	27	5.2	19	6	18	1.6	0.31
C	-	5.2	0	-	3	0	-	0.8	0.15
D	-	5.2	0	-	0	0	-	0.4	0.08
Estimated Qty:				13.5 bu					12 bu
2. Right-of-Way to 100 feet from Bridge									
E	-	5.2	0	0.0	0	0	-	0.9	0.17
F	-	5.2	0	0.0	0	0	-	0.8	0.15
G	-	5.2	19	3.6	14	8	30	1.5	0.29
H	-	5.2	5	1.0	0	0	0	2.6	0.50
Estimated Qty:				8 bu					14 bu
3. 100' - 200' from the Bridge									
3	MS	3.0	9	3.0	0	5	36	2.0	0.67
Estimated Qty:				43 bu					67 bu
4. 200' - 300' from the Bridge									
4	MS	3.0	12	4.0	0	4	25	0.5	0.17
Estimated Qty:				57 bu					17 bu

Table 3 (Contd.)

Sample Station	Bottom Type[1]	Area Covered (sq ft)	Live Oysters			Boxes		Shell	
			Number	Density (No./ft^2)	Spat	Number	Percentage of Total	Volume (qts)	Density (Qts/ft^2)
5. 300' - 400' from the Bridge									
5	MS	3.0	3	1.0	0	3	50	2.0	0.67
Estimated Qty:				14 bu					67 bu
6. 400' to 825' from the Bridge									
6	M	3.0	0	-	0	0	-	0	-
7	M	3.0	0	-	0	0	-	0	-
8	M	3.0	0	-	0	0	-	0	-
9	M	3.0	0	-	0	0	-	0	-
Estimated Qty:				0 bu					0 bu
7. 825' to 925' from the Bridge									
9a	Sh	6.0	40	6.7	13	2	5	3.1	0.5
10a	Sh	6.0	37	6.2	14	3	8	3.2	0.5
Estimated Qty:				92 bu					52 bu
8. Over 925' from the Bridge									
10	M	3.0	0	-	0	0	-	0	-
11	M	3.0	0	-	0	0	-	0	-
12	M	3.0	0	-	0	0	-	0	-
13	M	3.0	0	-	0	0	-	0	-
14	M	3.0	0	-	0	0	-	0	-
15	M	3.0	0	-	0	0	-	0	-

Table 3 (Contd.)

Sample Station	Bottom Type[1]	Area Covered (sq ft)	Live Oysters			Boxes		Shell	
			Number	Density (No./ft^2)	Spat	Number	Percentage of Total	Volume (qts)	Density (Qts/ft^2)
16	M	3.0	0	-	0	0	-	0	-
17	M	3.0	0	-	0	0	-	0	-
18	M	3.0	0	-	0	0	-	0	-
19	M	3.0	0	-	0	0	-	0	-
20	M	3.0	0	-	0	0	-	0	-
21	M	3.0	0	-	0	0	-	0	-
22	M	3.0	0	-	0	0	-	0	-
23	M	3.0	0	-	0	0	-	0	-
24	M	3.0	0	-	0	0	-	0	-
Estimated Qty:				0 bu					0 bu
Total Quantity Estimated on Mr. Firth's Ground:				260 bu					243 bu
Right-of-Way Including Underneath Bridge: 45.5 bu oysters and 25.9 bu shell (Table 3a)									
Below R/W: 214 bu oysters and 217 bu shell									

[1]M = Mud; MS = Muddy sand; ST = Stones; Sh = Shell.

Table 3a

Results of Separate Survey Under the Bridge - Brick Kiln Creek.
17 November 1978

Sample Station	Bottom Type[1]	Area Covered	Live Oysters		Boxes		Shell
			Number	Spat	Number	%	Volume
1	M	6.0	0	0	0	-	0.9
2	Sh, Tr	6.0	45	8	7	13	1.5
3	Sh, Tr	6.0	4	0	0	-	0.3
4	Sh, Tr	6.0	63	7	6	9	2.8
5	Sh, Tr	6.0	8	0	0	-	0.4
6	M	6.0	0	0	0	-	0.2
7	M	6.0	0	0	0	-	0.2
8	Sh, Tr	6.0	5	1	0	-	0.6
9	Sh, Tr	6.0	19	4	5	21	2.0
10	Sh, Tr	6.0	63	2	15	19	2.4
11	Sh, Tr	6.0	27	2	16	37	1.9
12	M	6.0	0	0	0	-	0.2
Estimated Qty:			32 bu[2]				13.9 bu[2]

[1] M = Mud; Sh = Shell; Tr = Trash.

[2] Used count of 400 oysters per bushel in calculation. Calculated quantity was doubled because tongs were fouled by trash on bottom making samples smaller than they otherwise would have been.

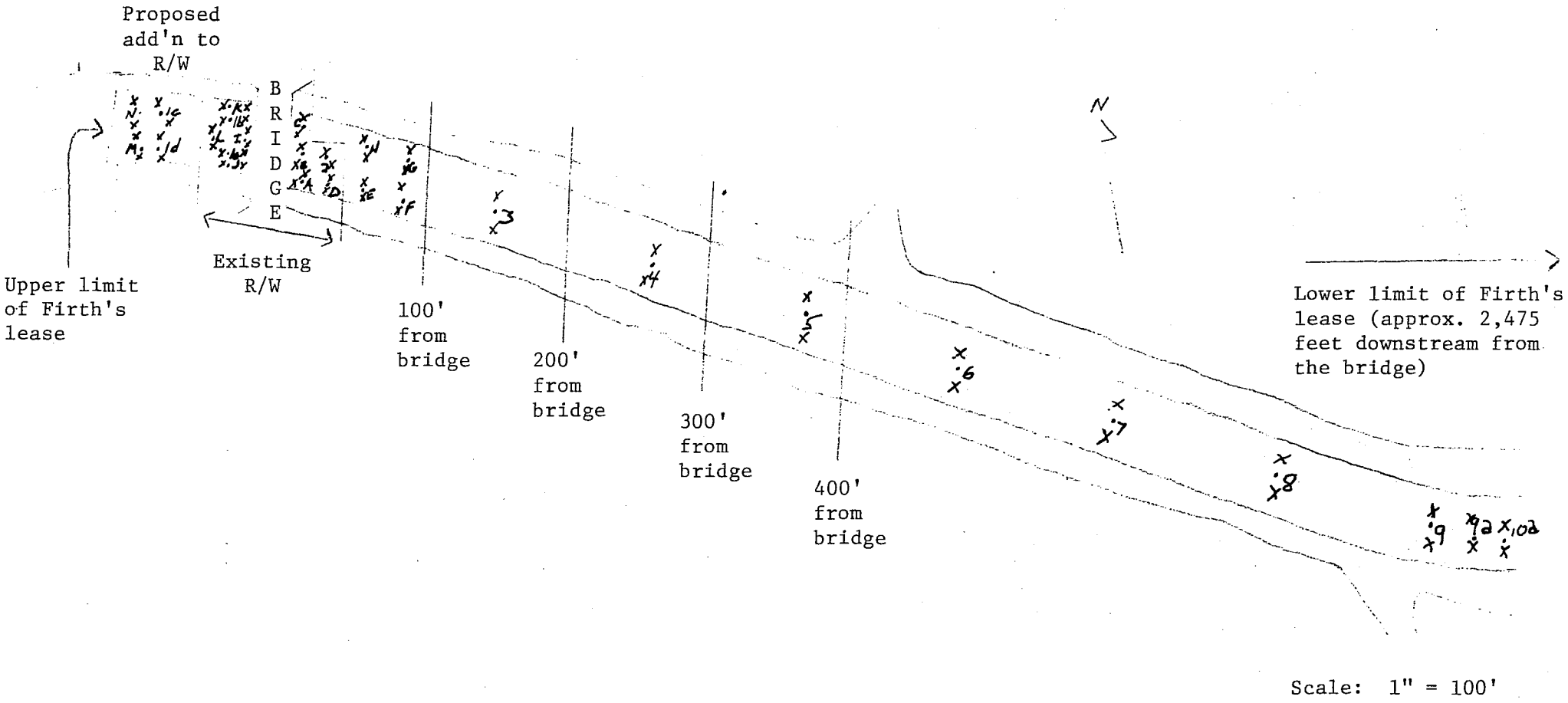


Figure 1a. Brick Kiln Creek: That Part of Mr. Firth's Leased Oyster Planting Ground Which is Near the Bridge. (Numbers and letters show stations; "x's" show where samples were taken.) In addition to the stations shown, there were twelve stations (2 samples each) under the bridge and 75 stations above the bridge (1 sample each).

Additional sampling was conducted near the bridge in October and November.

The bottom type, vegetation and fouling on the shells (if any) were noted for each station. Oysters and shells from both samples at a station were combined, divided according to size, counted and measured for volume.

Lengths of live oysters were measured and some were opened to observe the condition of the meats. From Mr. Hahn's ground, 83 oysters were measured and 46 large and small oysters were opened. From Mr. Firth's lease, 39 oysters were measured and 34 were opened. No oysters from Mr. Freeman's lease were measured or opened since we didn't have his permission at that time to take any oysters; we returned our samples to his beds.

RESULTS

Leased Ground of Mr. A. M. Firth

A) In the Bridge Right-of-Way - Our sampling indicated that oysters existed under and downstream of the bridge (Figure 2). Above the bridge, both in the existing right-of-way and the proposed addition to it, the bottom consisted of soft mud and was devoid of oysters. (No sampling was conducted upstream of the proposed addition to the right-of-way since that boundary coincided with the limit of the lease.)

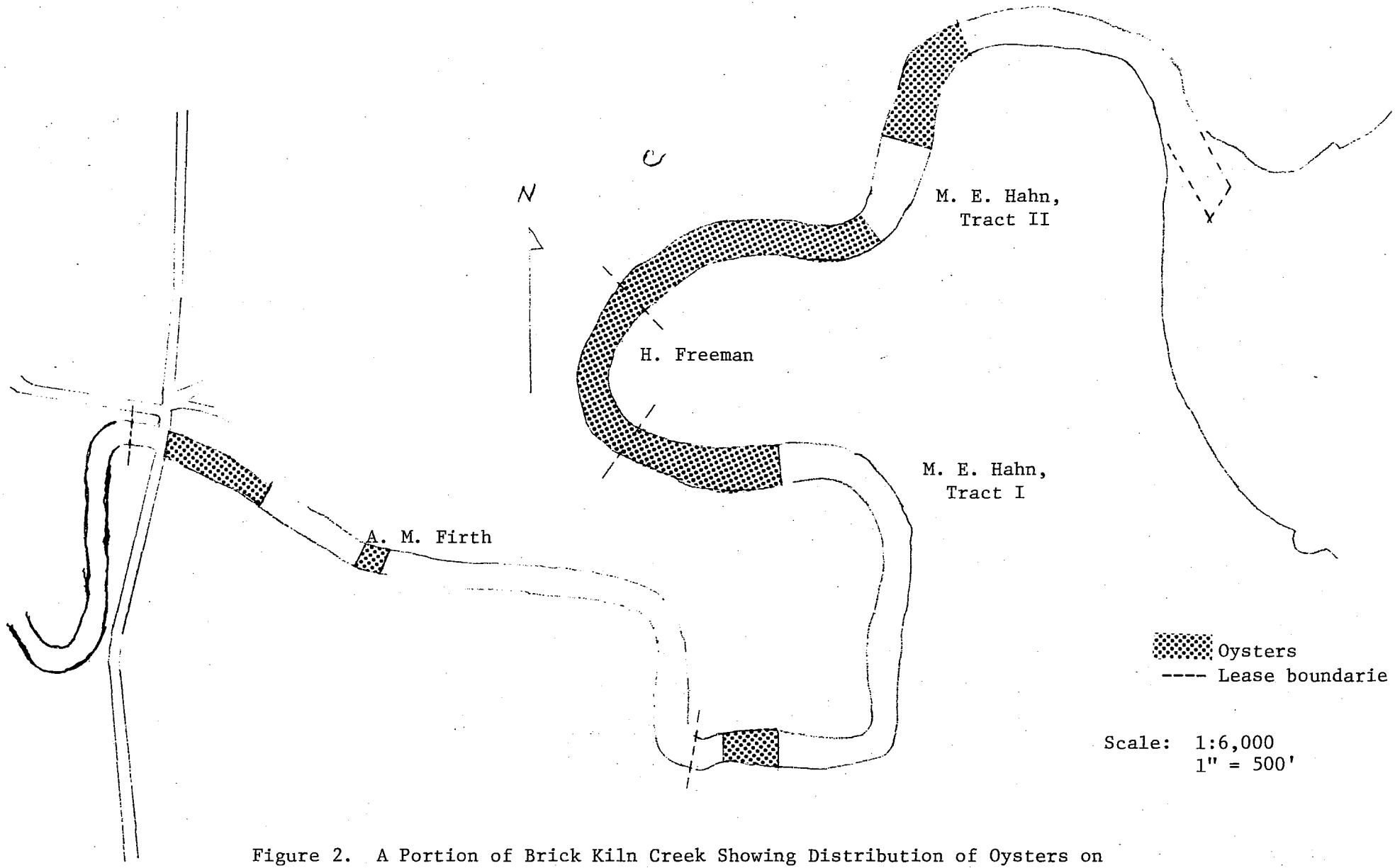


Figure 2. A Portion of Brick Kiln Creek Showing Distribution of Oysters on 16 August 1978 Along With Boundaries of Leased Oyster Planting Grounds.

The oysters found below the bridge showed recent growth of the shells. Boxes (hinged valves which are empty of meat) were present; their average frequency of occurrence was 18% (Tables 3 and 3a).

Numerous spat (averaging 103 spat per bushel of substrate) were obvious in samples taken in late October and mid-November which were not seen in the mid-August sampling. The numbers of spat seen here are comparable to quantities seen in the James River since 1960. The level of setting here and the large percentage of small oysters (Table 2) show that recruitment has been moderate when compared to the State average.

Estimates of the quantity of oysters present were calculated from data obtained by sampling (Tables 3 and 3a). Using methods defined in Table 2, it was calculated that 46 bushels of oysters and 26 bushels of shells were present in the existing and proposed addition to the right-of-way (0.176 acres).

When the total right-of-way area was divided into two separate portions labelled 001 and 002, the following calculations were made (Table 3b):

Area	Area of R/W	Est. Qty. of Oysters
001	0.083 acre	22.9 bu
002	0.093 acre	22.6 bu

Table 3b

Estimates of Quantities of Oysters and Shell in Areas 001 and 002 - Brick Kiln Creek.

Area	Oysters (bu)	Shell (bu)
001		
Above bridge	0.0	0.0
Under bridge	16.0	7.0
Below bridge	6.9	5.4
Total	22.9	12.4
002		
Above bridge	0.0	0.0
Under bridge	16.0	7.0
Below bridge	6.6	6.5
Total	22.6	13.5

B) Downstream of the Right-of-Way - On this part of Mr. Firth's lease (2.814 acres) oysters were found from the right-of-way boundary to 400 feet below the bridge. From that point to 825 feet away from the bridge the bottom was soft mud and devoid of oysters. Between 825 feet and 925 feet downstream of the bridge more oysters were found. Beyond 925 feet the bottom of the lease was soft mud and contained no oysters (Figure 1; Table 3).

At seven stations within 400 feet of the bridge (Figure 1a) samples collected totaled 48 oysters and 10.3 quarts of shell. From these data, we estimate that 122 bushels of oysters and 165 bushels of shells were in this segment (Table 3). The oysters here appeared to have been growing rapidly. Approximately half the oysters recovered were less than 3 inches. Spat were present (70 spat per bushel of bottom material) in the fall (late October).

The only other place on Mr. Firth's lease found to contain oysters was located between 825 and 925 feet from the bridge. Here 77 oysters and 6.3 quarts of shell were recovered at two stations (Table 3; Figure 1a). Estimated quantities of 92 bushels of oysters and 52 bushels of shell were calculated for this area. Significant numbers of oysters which had set earlier in 1978 were seen. Over 40% of the live oysters were small oysters with some yearlings, indicating sets in the last few years.

The overall mortality on this lease as shown by the average box count was 18%.

Leased Ground of Mr. Mahlon Hahn

A) Tract 1 - This 3.05 acre tract lies between Mr. Firth's lease and Mr. Freeman's lease (Figure 1). Samples were taken at 24 stations here. Oysters were found in two locations on this tract - one small patch at the upstream end and a larger one at the downstream end. Between the above areas of oysters, the bottom was mud and lacking of oysters (Figure 2).

The small patch of oysters was found at stations 1 and 2 (Figure 1; Table 4). Here 12 oysters and 4 quarts of shell were recovered with the tongs. Quantities of oysters and shell estimated here are, respectively, 34 and 77 bushels.

The larger distribution of oysters occurred at stations 19 through 24 (Figure 1; Table 4). The tongs recovered 96 oysters and 19 quarts of shell. Estimated quantities calculated from these data were 224 bushels of oysters and 297 bushels of shell.

Oysters from both places on this tract showed moderate growth on the shells and were plump enough to almost fill their shells. This area of ground was sampled in mid-August; no spat were seen at that time.

Mortality of oysters on this segment averaged 19%.

Table 4

Results of Sampling Ground Leased by Mr. Mahlon E. Hahn in Brick Kiln Creek - 16 August 1978.

Sample Station	Bottom Type[1]	Area Covered (sq ft)	Live Oysters		Boxes		Shell	
			Number	Density (No./ft^2)	Number	Percentage of Total	Volume (quarts)	Density (qts/ft^2)
Tract I								
1	MS, ST	5.2	2	0.4	3	60	2.0	0.4
2	MS, ST	5.2	10	1.9	6	38	2.0	0.4
Estimated Qty 1 & 2:				34 bu				77 bu
3	M	5.2	0	-	0	-	0.0	-
4	M	5.2	0	-	0	-	0.0	-
5	M	5.2	0	-	0	-	0.0	-
6	M	5.2	0	-	0	-	0.0	-
7	M	5.2	0	-	0	-	0.0	-
8	M	5.2	0	-	0	-	0.0	-
9	M	5.2	0	-	0	-	0.0	-
10	M	5.2	0	-	0	-	0.0	-
11	M	5.2	0	-	0	-	0.0	-
12	M	5.2	0	-	0	-	0.1	0.02
13	M	5.2	0	-	0	-	0.0	-
14	M	5.2	0	-	0	-	0.1	0.02
15	M	5.2	0	-	0	-	0.0	-
16	M	5.2	0	-	0	-	0.0	-
17	M	5.2	0	-	0	-	0.2	0.04
18	M	5.2	0	-	0	-	0.0	-
Estimated Qty 3-18:				0 bu				Negligible
19	MS	6.4	3	0.5	1	25	1.0	0.16
20	MS	6.4	19	3.0	5	21	2.0	0.31
21	Sh	6.4	9	1.4	4	31	3.0	0.47
22	S, ST	6.4	8	1.2	3	27	3.0	0.47
23	Sh	6.4	17	2.6	1	6	4.0	0.62
24	Sh	6.4	40	6.2	2	5	6.0	0.94
Estimated Qty 19-24:				224 bu				297 bu

Table 4 (Contd.)

Sample Station	Bottom Type[1]	Area Covered (sq ft)	Live Oysters		Boxes		Shell	
			Number	Density (No./ft^2)	Number	Percentage of Total	Volume (quarts)	Density (qts/ft^2)
Tract II								
25	Sh	6.4	29	4.5	0	-	3.0	0.47
26	Sh	6.4	69	10.8	3	4	7.0	1.09
27	Sh	6.4	25	3.9	6	19	4.0	0.62
28	Sh	6.4	7	1.1	2	22	3.0	0.47
29	Sh	6.4	2	0.3	1	33	1.0	0.16
Estimated Qty 25-29:				309 bu				281 bu
30	M	6.4	0	-	0	-	0.0	-
31	M	6.4	0	-	0	-	0.0	-
32	M	6.4	0	-	0	-	0.0	-
33	M	6.4	0	-	0	-	0.0	-
34	M	6.4	0	-	0	-	0.0	-
35	M	6.4	0	-	0	-	0.0	-
Estimated Qty 30-35:				0 bu				0 bu
36	S, Sh	7.5	22	2.9	4	15	6.0	0.80
38	Sh	7.5	36	4.8	8	18	8.0	1.07
40	Sh	7.5	13	1.7	5	28	3.0	0.40
Estimated Qty 36-40:				236 bu				378 bu
Total Quantities on Mr. Hahn's Ground:								
Tract I				258 bu				374 bu
Tract II				545 bu				659 bu
TOTALS				803 bu				1,033 bu

[1]MS = Muddy sand; ST = Stones; M = Mud; S = Sand; Sh = Shell.

B) Tract II - This part of Mr. Hahn's leased ground (4.00 acres) extends from Mr. Freeman's lease downstream to the mouth of the creek (Figure 1). At the upper end of this tract, live oysters were found on shelly bottom. More oysters and shell were found at the lower end of our sampling (we did not sample the lower-most 250 feet of this tract). Between the areas with the oysters the bottom was soft mud with no oysters (Figure 2).

On this tract (just downstream of Mr. Freeman's lease) oysters were found at the highest density (10.8 oysters/square foot) of anywhere that we sampled (Table 4). In all, we found 132 oysters and 18 quarts of shell at 5 adjacent stations. We estimated that 309 bushels of oysters and 281 bushels of shell were present in this zone.

Further downstream, at stations 36, 38 and 40, 71 oysters and 17 quarts of shells were found. Oysters were found at stations 37 and 39 in quantities similar to those at the other three stations. The quantities estimated in this zone were 236 bushels of oysters and 378 bushels of shell. Both areas on Tract II were estimated to contain 545 bushels of oysters and 659 bushels of shell.

Mortality (estimated by box counts as a percentage of total oysters recovered) was 12% on Tract II.

Considering both tracts of Mr. Hahn's lease: Oysters showed moderate growth of shell. This ground was

sampled in mid-August only. No spat were found at that time. The fact that a large proportion (41%) were small oysters with some yearlings shows that recruitment in the area has been good. In total, an estimated 803 bushels of oysters and 1,033 bushels of shell were present on Mr. Hahn's lease on 16 August. The above observations indicate that some areas of very good oyster ground exist on Mr. Hahn's lease.

Leased Ground of Mr. Herbert Freeman

This 0.63 acre oyster ground lease lies about halfway between the bridge and the mouth of the creek and separates Tract I and Tract II of Mr. Hahn's lease. Ten samples were taken at five stations; samples showed that oysters were present all along the lease (Figure 2).

A total of 155 oysters and 18 quarts of shell were tonged on this lease (Table 5). It is estimated that the lease contained 359 bushels of oysters and 280 bushels of shells. Most of these oysters (51%) were small oysters and yearlings (Table 2).

Oysters were tonged here and counted, then returned to the water; they were not retained for further study because we did not know at that time whether we had permission to retain any of Mr. Freeman's oysters. No observations as to length of oysters, presence of spat, count of boxes or count of live oysters per bushel were made.

All observations which we made indicate that the entire part of Mr. Freeman's lease is productive of oysters.

Table 5

Results of Sampling Ground Leased by Mr. Herbert Freeman in Brick Kiln Creek - 16 August 1978.

Sample Station	Bottom Type[1]	Area Covered (sq ft)	Live Oysters		Shell	
			Total Number	Density (No/ft^2)	Volume (qts)	Density (qt/ft^2)
1	Sh	6.4	10	1.6	2.0	0.31
2	Sh	6.4	41	6.4	5.0	0.78
3	Sh	6.4	29	4.5	7.0	1.09
4	Sh	6.4	39	6.1	2.0	0.31
5	Sh	6.4	36	5.6	2.0	0.31
Total or overall		32.0	155	4.8	18.0	0.56
Estimated Qty:				359 bu		280 bu

[1] Sh = shell.

Also, there is good recruitment there, as evidenced by the large proportion of small oysters and yearlings. In summary, this is a very good piece of oyster ground.

SUMMARY

Value of the Oysters on the Various Leases

Value of the shellfish resource on each lease was estimated using various factors. Quantities of live oysters and shells which had been estimated from our sampling were used. A price of $12 per bushel was used for live oysters; this price is what a bushel of good oysters brought a tonger. Using a price of $12/bu leads to a maximum estimated value, since money paid for harvesting the oysters has not been deducted. For shells, the price of 26¢ per bushel was used; this is the price paid by the Virginia Marine Resources Commission in 1977. The value shown for shells, then, is the estimated cost of replanting shells equal in quantity to what was found on each lease when sampled. No clams or other commercially valuable shellfish were found.

Mr. Firth's Lease

Oysters and shell in the right-of-way were estimated to have a value of $546 and $6.73, respectively. When the right-of-way area was divided into two parts, part 001 had an estimated $275 worth of oysters and $3.22 of shell while 002 contained $271 of oysters and $3.51 of shell (Table 6).

Table 6

Estimated Value[1] of Oysters and Shells on Leased Ground in Brick Kiln Creek.

Lease	Oysters		Shells	
	Quantity (bu)	Value ($)	Quantity (bu)	Value ($)
Mr. Firth's				
In right-of-way	45.5	546	25.9	6.73
Area 001	22.9	275	12.4	3.22
Area 002	22.6	271	13.5	3.51
In remainder	214.0	2,568	217.0	56.42
Total	259.5	3,114	242.9	63.15
Mr. Hahn's				
Tract I	258.0	3,096	374.0	97.24
Tract II	545.0	6,540	659.0	171.34
Total	803.0	9,636	1,033.0	268.58
Mr. Freeman's	359.0	4,308	280.0	72.80

[1]Calculation of value based on the following prices: for oysters - $12/bu, which is maximal; for shells - 26¢/bu.

Below the right-of-way, on the remainder of Mr. Firth's lease, values of the oysters and shell were, respectively, $2,568 and $56.42.

Mr. Hahn's Lease

Oysters and shell in Tract I were estimated to have a value of $3,096 and $97.24, respectively. Tract II contained an estimated $6,540 worth of oysters and $171.34 of shell (Table 6).

Mr. Freeman's Lease

This plot of ground was estimated to contain $4,308 worth of oysters and $72.80 worth of shell (Table 6).